VI. Regional and Global Considerations

The participants in the Montreal Process recognized the essential role that forested ecosystems play in the long-term well-being of local populations, national economies and the earth's biosphere as a whole. Thus, while individual forest management plans address the conditions and needs of specific properties, those plans should be developed in the context of larger systems. This is the basis for development of these ecoregional guidance documents, but even they must consider larger regional and even global issues.

For example, much has been written in recent years about the role of forests in "tying up" or sequestering carbon, primarily by absorbing carbon dioxide. This in turn plays a major role in reducing concentrations of greenhouse gases in the atmosphere – considered to be a primary cause of global warming. This important role of forests appears to be influenced by the age and other conditions of forest stands (e.g., younger, faster-growing trees tend to sequester more carbon than older mature trees). However, since our understanding of carbon cycling and its significance in the environment is incomplete, no specific management goal related to carbon sequestration will be presented. EOEA will continue to monitor new developments in the area however, and develop or modify individual land management plans accordingly.

Across the globe, there are numerous examples of the vital role that forested watersheds play in protecting drinking water supplies (Dudley and Stolton, 2003). Some of these watersheds are far-removed from the population centers that rely on the water they provide. One example of such a water supply is: the "Springfield Water & Sewer Commission", which wholesales water to the communities of Agawam , East Longmeadow and Longmeadow and supplies partial service or peak service to Southwick, Westfield and West Springfield. The Commission serves a total population of approximately 250,000 with average annual water sales at 37 million gallons per day (MGD). The main source of supply is the Little River in Western Massachusetts with raw water storage at its Borden Brook and Cobble Mountain Reservoirs. The entire watershed is ~31,400 acres. The Commission owns and manages ~14,500 acres, excluding ~1,300 acres of major water bodies (~15,800 total acres: just over 50%). Approximately 9,000 acres within the watershed are either held by the State Division of Fisheries and Wildlife or classified under Chapter 61[1]. The area is within the Hudson Highlands (Berkshire Transition Association) and the Berkshire-Vermont Upland Ecoregions (communities of: Blandford, Granville, Otis, Russell, Tolland, and Westfield). The Commission actively manages these lands under a forest management plan and has a full-time forester on staff. The forested lands surrounding the reservoirs are managed to produce and maintain a "protection forest" that will be resilient and resistant to major disturbances that could potentially impact water quality. This protection forest will include a diversity of species as well as age classes across the watershed.

The protection of drinking water supplies and water quality in general is also a function of the land uses within the corresponding watersheds. The best water quality generally originates from undeveloped vegetated areas where rainwater is able to percolate into the ground, and overland flow is minimized. Different land uses or cover types vary in their "permeability," ranging from the highly permeable (e.g., undisturbed forests) to highly impervious (e.g., asphalt parking lots). Using permeability values developed by DEP and MassGIS, it was estimated that the overall imperviousness of the Berkshire Ecoregions is approximately 2% (**Table 18**). Additional data on the imperviousness estimates of each Berkshire Ecoregion and Land Type Association can be found in **Appendix XI**. Previous research has concluded that water quality problems tend to arise when imperviousness approaches 10% (Center for Watershed Protection, 1998).

Land use data can also be used to estimate pollution loading, and models have been developed to calculate nitrogen, phosphorus and suspended solids based on land uses within particular drainage areas.

[1] M.G.L., Chapter 61 – "Classification and Taxation of Forest Lands and Forest Products"

It should be noted however, that ecoregion boundaries are not coincident with watershed boundaries, so the methods used to estimate imperviousness and pollution loadings are not directly applicable to the ecoregion as a whole. Regardless, the general relationships still apply and provide another example of why a larger perspective is often needed. Water draining from the Berkshire Ecoregions feed at least 6 major rivers in the state, potentially transporting nutrients and pollutants into Hudson, Housatonic and the Connecticut Rivers which flow into Long Island Sound and the Atlantic Ocean…

Finally, the ~300,000 people that live in the Berkshire Ecoregions consume large quantities of energy, the vast majority of which is generated elsewhere. Sustainability principles call for more local production of products and energy supplies. At present, it is estimated that most of the forest products harvested in these ecoregions are exported out of the region for processing, while the resources needed by its residents are imported.

Table 18. Imperviousness estimates in the Berkshire Ecoregions.

Land Use	*IC*[1]	*AC*[2]	*IAE*[3]
Cropland	0.01	56,113	561
Pasture	0.01	28,795	288
Forest	0.01	896,851	8,969
Non-forested Wetland	0.01	20,493	205
Mining	0.01	2,278	23
Open Areas with no vegetation	0.01	21,608	216
Participation Recreation	0.02	7,140	143
Spectator Recreation	0.02	165	3
Water Based Recreation	0.02	108	2
Multifamily Residential	0.80	794	635
High Density Residential	0.57	7,427	4,233
Medium Density Residential	0.13	10,389	1,351
Low Density Residential	0.10	47,792	4,779
Saltwater Wetland	0.01	-	-
Commercial	0.90	3,660	3,294
Industrial	0.75	2,051	1,538
Urban Open	0.01	4,987	50
Transportation	0.75	2,147	1,610
Waste Disposal	0.01	619	6
Water	0.01	17,549	175
Woody Perennial	0.01	3,032	30
(missing data)	-	13	-
Ecoregion Totals:		**1,134,011**	**28,111**
OVERALL PERCENT IMPERVIOUS =			**2%**

Source: DCR / MassGIS (1999 Landuse data)

[1] IC = Imperviousness Coefficient:
Estimate of the proportion of a landuse that is considered to be impervious.

[2] AC = Acres

[3] IAE = Impervious Acres Equivalent